REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Objections to Disclosure

The objections to the disclosure have been addressed as follows:

a. "LSP counts" and "LPC counts" have been changed, respectively, to –LSP parameters– and –LPC coefficients–, which are well-known terms in the art. Use of the word "counts" was not intended to be misleading, but rather resulted from a poor translation of the corresponding Korean language terms.

b. The phrase "specific row in a sub-vector" has been changed to –specific *position* in a sub-vector–. For technical reasons, the sub-vector is a column vector that does in fact include "rows," but the word "position" is just as accurate and overcomes the objection.

c. An explanation of subscript l,m has been added to equation 2, and an explanation of subscript l,n has been added to equation 3. In both cases, "l" represents the letter, not the number.

d. An explanation of the superscript symbol *T* has also been added to equation 2. Superscript *T*, when attached to a vector or matrix, is commonly used by those skilled in the art to indicate that the vector or matrix has been transposed for purposes of taking a "dot product" of the vector and another vector (which in this case is simply the weighted difference vector–the Examiner will note that equation 3 is simply the weighted least-mean-square error formula). In this case *T* is not a variable, but rather a commonly used mathematical symbol. Generally, the symbol is used without explanation, as evidenced by **Exhibit I** attached hereto,[1] although an explanation has been added to equation 3 for the purpose of overcoming the objection. The explanation comes from **Exhibit II, CSE 291**

[1] Visala Namburu, "*Speech Coder Using Line Spectral Frequencies Of Cascaded Second Order Predictors*," Thesis, Virginia Tech. (November 2001), page 42, eq. 4-13, available on-line

Lecture Notes, attached hereto to show that the symbol *T* for transpose is, in this context, conventional and <u>not new matter</u>.

e. "LSF" in line 5 on page 6 has been changed to –LSP–, as suggested by the Examiner.

f. The symbol L is now defined in line 9 on page 6 as being the number of reference rows (as is clearly apparent from Fig. 3).

g. With respect to subscript m in line 5 on page 7, it is respectfully submitted that since m is used to denote the mth codebook, just as it is in line 17 on page 5, use of the index m is in fact proper. Therefore, the index has not been changed.

h. With respect to equation 6 on page 11, it is respectfully submitted that *i* is an index for each of the four pulses, and that m_i is in fact the position of the i^{th} pulse, as defined on page 13. As explanation of $\mathbf{m}_i$ has therefore been added to page 11. <u>However</u>, while it is true that *i* does not have the same meaning as in the LSP calculation on page 9, it is respectfully submitted that since *i* is unambiguously defined in both instances, its use for indexing purposes is not confusing. To the contrary, since equation 6 is written in standard format, it is believed that it is *less* confusing to leave the index as *i*, and therefore *i* has not been changed.

i,j,k The Examiner is correct that Column 2 of Table 1 should be labeled "vector" or c(n), and that the pulses have sizes of plus one or minus one at a designated position, rather than the 4 pulses in a single designated position. Page 11 and table 1 have been corrected accordingly.

l. In line 11 on page 12, "optical" has been changed to –optimal–, as suggested by the Examiner.

m. With respect to the superscript symbol t in equation 8, it is respectfully noted that this is the same "transpose" symbol used in equation 2. It is respectfully submitted, based on the attached Exhibits I and II and the explanation given above, that those skilled in the art would understand the symbol, and therefore that no further amendment is necessary.

n,o. Those skilled in the art will understand that the d in d(n) is the same as the correlation vector **d** defined in the paragraph immediately preceding equation 8 on page 12, and that $\Phi(i,j)$ of equation 10 is the same as the correlation matrix $\mathbf{\Phi}$ described in the same preceding paragraph.

p. It does not matter that some i's and j's are italicized and some are not. For some reason, when the equation editor of the Word Processing program is used, the i's and j's always end up being italicized. However, the i's and j's of corresponding equations and descriptions thereof are in fact the same, as would be understood by those skilled in the art.

q. The description of equation 11 has been amended to clarify that equation 11 is the formula for matrix C, which corresponds to matrix C_k of the numerator of equation 8.

r. An explanation of ϕ has been added to the description of equation 12.

s. Page 13, line 19 has been amended to clarify that there are 40 pulse *positions* given in table 1, and not 40 pulses. The table 1 index may indeed by the index that is searched as described at page 16.

t. Page 15, lines 4-5 do not imply that the tracks represented in Table 1 have values of d'(n). Instead, the cited passage describes the maximum value of d'(n) "**in** the three tracks." Variable d is still the correlation vector between the object signal x'(n) and impulse response h(n) for available pulsed in the respective tracks. It is therefore respectfully submitted that the description in lines 4-5 on page 15 is not inconsistent with earlier descriptions of d'(n).

u. Equations 4 and 5 on page 7 refer to the rows of a general code vector, while page 15, lines 18-19 refer to pulse position indices of **tracks** of the G.729 fixed codebook, with "N_1" being the position index corresponding to the second row. Those skilled in the art will appreciate that the invention involves reducing a size of the codebook *and* providing a high speed search method involving detection and searching ***tracks*** on the basis of a magnitude order of a correlation signal (d'(n)) obtained by an impulse response and a target signal **in the process of**

searching the fixed codebook of the G.729 speech encoder. The pulse position indices are analogous to the rows of the code vector, which is why the index N is used in both instances, but N obviously can have different values in each situation.

w,x. See the explanation in part t, above.

y. Page 16, line 5 has been amended to clarify that the index is a *position* index of the optimal pulse in a loop of each track. This is <u>not</u> the same as the codebook, but rather is part of the codebook search, as described in lines 14-22 on page 15.

z. Page 16, lines 9-10 have been amended to clarify that what is shown in Table 4 are probabilities to be an optimal pulse position, the pulse positions corresponding to position indexes.

aa,dd. Page 16, line 14 and page 17, line 8 have been amended to clarify that Ck corresponds to C_k of Equation 8.

bb,cc. Page 16, line 20 and page 17, line 1 have been amended to clarify that the formula for the threshold is formula 15, not formula 17, and that what is being summed are the d'(n) values, whose meaning is explained on pages 12-16.

ee. This objection has been addressed by amending the first paragraph on page 16 to refer to the sub-frame search.

ff-ii. Page 19, lines 3-12 have been amended to refer to "values" and "value magnitudes" as suggested by the Examiner.

jj. Page 19, lines 14-15 has been amended to clarify that "index" simply refers to the number that designates the pulse position (see part z, above).

kk. This objection is respectfully traversed on the grounds that page 20, lines 9-17, do not state that track 3 shown in Table 1 shows 5, 6, or 32. Instead, (5, 6, 32) is an arbitrary example of a pulse position index composition that is used to show the manner in which Table 3 is applied to obtain search candidates by adding the pulse position indexes 3, 8, and 39 (which in fact are shown in Table 3) to obtain (5, 6, 32, 3), (5, 6, 32, 8), . . ., (5, 6, 32, 39).

ll. Page 21, line 19 has been amended to refer to Table 4 rather than FIG. 4.

mm. Page 22, line 9 has been amended by changing Ck to C_k.

nn. Claim 5 has been amended by changing "tracts" to –tracks–.

2. Objections to Claims

The objections set forth in item 4 on page 8-12 have been addressed as follows:

a. "LSP count(s)" has been changed to –LSP parameter(s)–, as explained above in connection with a corresponding change made to the specification.

b-d The codebook rearranging step has been rewritten to refer to first and new codebooks, as described beginning in line 7 on page 6 of the original specification.

e. The term "rows" in claim 3 has been replaced by –positions– when referring to element values in the target vector, as discussed above in connection with a corresponding change made to the specification.

f,g. This objection has been addressed by inserting equation 2, described in the specification, into claim 3.

h. This objection has been addressed by changing "tract(s)" to –track(s)– in claim 5, as suggested by the Examiner.

i-p. These objections have all been addressed by amending claims 6-8 to correspond to the Examiner's interpretations, as set forth in items i-p.

3. Rejection of Claim 1 Under 35 USC §102(b) in view of U.S. Patent No. 4,907,276 (Aldersberg)

This rejection is respectfully traversed on the grounds that the Aldersberg patent does not disclose or suggest a high speed search method in which a first codebook is replaced by a new code book according to element values of a reference row, as recited in claim 1, ***and in which a search range is determined according to an order character between a given target vector and an arranged code vector to obtain an optimal code vector***, *i.e.*, **by optimizing a code vector according to an order property**. Instead, the method of Aldersberg involves expediting searching by limiting the search area to subgroups characterized by code vectors that have a same

distance measure r_p, which is not the same as determining a search range according to order property of code vectors in a subgroup.

Because the Aldersberger does not disclose or suggest the positively recited feature of optimizing a code vector by an order character between a given target vector and an arranged code vector in respective codebooks, withdrawal of the rejection of claim 1 under 35 USC §102(b) is respectfully requested.

4. Rejection of Claim 5 Under 35 USC §102(b) in view of U.S. Patent No. 5,194,864 (Nakano)

This rejection is respectfully traversed on the grounds that the Nakano patent fails to disclose or suggest a high speed search method in which position indexes of tracks are arranged in descending order according to a correlation level (calculated during pre-processing).

Rather than re-arranging the track indexes in descending order by **correlation level**, the embodiment referred to by the Examiner (col. 13, lines 53-64) re-arranges network indexes in the order of decreasing **ignition amounts**. The ignition amounts are not correlation levels. Instead, the ignition amounts are output amounts (indexes likely to exhibit large strains) obtained by searching **all** the code book vectors (col. 13, line 10).

In addition, it is respectfully noted that Nakano does not teach a G..729 speech encoder or any sort of speech encoding, but rather teaches a strain calculation. Loss of tone quality is not a consideration in Nakano, and therefore there is no need for the claimed track-by-track processing.

5. Double Patenting Rejection of Claim 1 in view of U.S. Patent No. 6,622,120 (Yoon)

Initially, it is noted that the present application does not have the same assignee as the Yoon patent, and has a different inventive entity (with some inventors in common). Therefore, a double patenting rejection is not appropriate.

Insofar as the Yoon patent may form the basis for a rejection under 35 USC §102(e), the prospective rejection is respectfully traversed on the grounds that the Yoon patent does not disclose or suggest a high speed search method in which a first codebook is replaced by a new code book according to element values of a reference row, as recited in claim 1, and in which a search range is determined according to an order character between a given target vector and an arranged code vector to obtain an optimal code vector, i.e., <u>by optimizing a code vector according to an order property</u>. Instead of optimizing a code vector according to an order property, Yoon converts the original target vector and code vector based on the order property, and then minimizes the error standard. This is similar to the invention, but involves a reversal of search priorities and the use of different equations, and ultimately is not as efficient as, and not suggestive of, the claimed invention.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

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